Options of Improving the Electricity Network Tariff System in Germany to Support a Secure, Environmentally Sound and Economically Efficient Energy Transition

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Summary

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Summary

Objectives and Methodical Approach

Charges for the use of transmission and distribution networks represent a relevant part of total electricity prices in public power supply. They determine the way in which network costs are allocated among network users, and at the same time, they influence network users' behaviour. Therefore, the network tariff system is a core aspect of the debate on the costs of the energy transition and the financial contributions consumers have to provide. On this backdrop, the study at hand investigates design objectives and requirements of the network tariff system as well as options to improve the present tariff system.

The study highlights that ideally, network charges should reflect as precisely as possible the effects of network users' investment and dispatch decisions on network costs. In that case, network charges provide network users with incentives to behave in a way that contributes to the general objective of efficient energy supply. However, this principle of cost-reflectiveness cannot be implemented in a perfect manner. For many aspects, an unambiguously optimal design option cannot be found. Other criteria are therefore important, as well, e.g. the question if the distribution of network costs among network users is considered fair. Moreover, ecological objectives like energy efficiency have to be taken into account. The design of a network tariff system therefore requires to trade-off different objectives against each other, like the efficiency of incentives, the appropriateness of cost distribution effects as well as practical aspects like simplicity and transparency of the tariff system for network users, network operators and regulatory authorities.

Based on these fundamental considerations, the study investigates the issues that are predominantly addressed in the debate as well as their interrelations with the network tariff system. It turns out that a large part of these issues relate to the *incentive effects* of network charges. Among others, participants of the debate argue that network charges contribute to an excessively high level of electricity prices as compared to prices of other forms of energy, thus creating a barrier to so-called sector-coupling technologies. Network charges are also criticised for providing disincentives to network users with respect to offering their flexibilities. Furthermore, the network tariff is considered to provide overly high incentives for the use of self-generation concepts. An issue that is mainly related to *cost distribution effects* is the spread of tariff levels between different regions and between urban and rural networks.

The study analyses a large spectrum of options that could be adopted to cope with these issues. It focuses particularly on the structure of network charges that are raised from consumers, i.e. the denominators of charge components, their dimensioning principles and, as far as relevant, their differentiation with respect to time and place of use. Besides this, the study also investigates the option of introducing network charges – be it periodical or one-off charges – to be paid by the operators of generation units. Furthermore, options to influence the regional spread of the level of network charges are investigated. Such options can, for instance, relate to the mechanisms of cost allocation between the different voltage levels or to mechanisms of cost distribution between network operators on the same voltage level.

These design options are first investigated in a qualitative manner, looking at their implications and the feasibility of their implementation. Second, a number of selected options are investigated with respect to their quantitative implications on the level of network charge components and their cost distribution effects for different types of network users as compared to the current situation. This quantitative analysis is based on a fictitious model network operator operating the whole of the electricity distribution networks in Germany.

Main Results

- In order to foster cost-efficient energy supply in the context of the energy transition, network charges should appropriately reflect those costs in the network sector that are caused by the individual investment and dispatch decisions of network users. Therefore, the design of the network tariff system, in terms of the characteristics and dimensioning of the price components, should properly take into account the relevant drivers of network costs.

- Today, the network tariff system focuses strongly on the amount of *energy withdrawal* from the networks. An analysis of relevant cost drivers however suggests that network costs do not depend that dominantly on energy withdrawal. An important part of network costs is rather associated to providing *network connections* at the desired level of *network capacity* to customers. This is only weakly reflected by network tariffs today.

- Network charge components related to characteristics of the customers' network connection points would be suited to reflect those cost drivers in a more appropriate manner. They could be composed of *fixed price* components per connection point and *capacity price* components relating to the capacity of connection points as agreed with the network customers.

- As far as private and commercial customers connected to the low voltage level are concerned, a capacity price component appears less recommendable. Moreover, for these customers, a *fixed price per end consumer* – as already paid today by a part of these customers – could turn out more appropriate than a *fixed price per network connection point*.

- Furthermore, the regulations regarding one-off charges to customers for the installation or expansion of network connection points ("Baukostenzuschüsse") should be devised clearer and more binding for all voltage levels than they are today.

- These adaptations to the tariff would allow to reduce those charge components that depend on the customers' annual energy withdrawal (*energy price*) or their maximum quarter-hourly withdrawal (*power price*). Potentially, the power price could even be abolished completely.

- This would help reduce cost of additional electricity consumption (at existing network connection points) as compared to other forms of energy and thus reduce barriers to the efficient use of electricity in the heat and the mobility sectors (sector coupling). Furthermore, with network charges being related partly to characteristics of network connection points, customers with self-generation would be incentivised to take more account of electricity market price signals than to savings of network charges when dispatching their units.

- The proposed adaptations would have implications on the cost allocation among network users: By trend, customers with a comparably high consumption would then pay less than before, and customers with a comparably low consumption more than before. In detail, however, the implications depend strongly on other characteristics of electricity consumption (e.g. the utilisation factor) and on other potential adaptations to the network tariff system.

- Consumers can be incentivised to voluntarily adapt their consumption to the degree of network utilisation by introducing *time-of-use energy price* components. Before implementing such approach, expected benefits and complexity should however be thoroughly assessed.

- It appears plausible, in principle, to raise capacity prices or one-off charges also from the *operators of generation units*. This could help reduce network charges in regions with a high penetration of decentralised generation. Yet, in case these charges were only raised for new

generation units, this reduction would take place rather slowly. Such charges could also provide locational signals for new generation plants. However, other instruments like the renewable energy tendering procedures appear more appropriate for this purpose.

- In order to reduce the regional spread of network tariff levels, it appears promising to socialise among network operators the costs of integrating additional renewable generation. This part of network costs can be roughly approximated. However, it would be recommendable to further investigate benefits and efforts for such approach before implementing it.